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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

(54) Title: IMPROVED MULTILAYER PRINTED CIRCUIT BOARD VIA HOLE REGISTRATION AND ACCURACY

(57) Abstract: A method of making printed circuit board vias using a double drilling and plating method is disclosed. A first hole is drilled in a core, the first hole having a first diameter. The first hole is filled and/or plated with an electrically conductive material. A circuit pattern may be formed on one or two conductive layers of the core, A multilayer structure may then be formed including a plurality of cores that also include pre-drilled and plated via holes, wherein at least some of the pre-drilled and plated via holes are aligned with the first hole. A second hole is then drilled within the first hole and the aligned pre-drilled and plated holes, the second hole having a second diameter where the second diameter is smaller than the first diameter. A conductive material is then plated to an inner surface of the second hole.



**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US 2017/056681

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| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br><div style="text-align: right; margin-right: 100px;"> <b><i>H05K 3/46 (2006.01)</i></b><br/> <b><i>H05K 3/42 (2006.01)</i></b> </div> According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                          |
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br><div style="text-align: center; margin-top: 10px;">H05K 3/00, 3/40, 3/42, 3/46</div> Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br><br>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br><div style="text-align: center; margin-top: 10px;">PatSearch (RUPTO internal), Esp@cenet, PAJ, USPTO, Information Retrieval System of FIPS</div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                          |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                          |
| Category*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Relevant to claim No.                                                                                                                    |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | US 2015/0007933 A1 (SANMINA CORPORATION) 08.01.2015, fig. 3, p. 2, paragraphs [0022] - [0033], p. 3, paragraph [0033] - [0035]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1-14                                                                                                                                     |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | US 2016/0295707 A1 (NIPPON MEKTRON, LTD.) 06.10.2016, fig. 5a, 5b, p. 7, paragraphs [0119] - [0125]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1-14                                                                                                                                     |
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| <div style="display: flex; justify-content: space-between;"> <span><input type="checkbox"/> Further documents are listed in the continuation of Box C.</span> <span><input type="checkbox"/> See patent family annex.</span> </div>                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                          |
| *                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Special categories of cited documents:<br><div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>“A” document defining the general state of the art which is not considered to be of particular relevance</p> <p>“E” earlier document but published on or after the international filing date</p> <p>“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>“O” document referring to an oral disclosure, use, exhibition or other means</p> <p>“P” document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>“&amp;” document member of the same patent family</p> </div> </div> |                                                                                                                                          |
| Date of the actual completion of the international search<br><div style="text-align: center; margin-top: 5px;">01 March 2018 (01.03.2018)</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Date of mailing of the international search report<br><div style="text-align: center; margin-top: 5px;">26 April 2018 (26.04.2018)</div> |
| Name and mailing address of the ISA/RU:<br>Federal Institute of Industrial Property,<br>Berezhkovskaya nab., 30-1, Moscow, G-59,<br>GSP-3, Russia, 125993<br>Facsimile No: (8-495) 531-63-18, (8-499) 243-33-37                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Authorized officer<br><div style="text-align: center; margin-top: 10px;">O. Gudkova</div> Telephone No. (495)531-64-81                   |